



US008257104B2

(12) **United States Patent**
Ferderer

(10) **Patent No.:** **US 8,257,104 B2**
(45) **Date of Patent:** ***Sep. 4, 2012**

(54) **DEVICE FOR SECURING A CONNECTOR**

(75) Inventor: **Albert Ferderer**, Espelkamp (DE)

(73) Assignee: **Harting Electric GmbH & Co., KG**
(DE)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

3,993,394 A	11/1976	Cooper	339/136
4,647,140 A	3/1987	Crawford	339/176
4,764,130 A	8/1988	DiClemente	439/686
5,123,721 A	6/1992	Seo	312/333
5,137,466 A *	8/1992	Endo et al.	439/357
5,178,556 A *	1/1993	Chen	439/357
5,178,557 A *	1/1993	Hashiguchi	439/357
5,197,901 A *	3/1993	Hashiguchi	439/352
5,199,897 A *	4/1993	Hashiguchi	439/357
5,254,013 A *	10/1993	Tanaka	439/352
5,334,041 A *	8/1994	Anbo et al.	439/358
5,383,794 A *	1/1995	Davis et al.	439/352
5,545,052 A *	8/1996	Hirai	439/354

(Continued)

(21) Appl. No.: **13/274,115**

(22) Filed: **Oct. 14, 2011**

(65) **Prior Publication Data**

US 2012/0034811 A1 Feb. 9, 2012

Related U.S. Application Data

(63) Continuation-in-part of application No. 11/120,020, filed on May 2, 2005, now Pat. No. 8,038,463.

(30) **Foreign Application Priority Data**

May 7, 2004 (DE) 20 2004 007 300 U

(51) **Int. Cl.**
H01R 13/627 (2006.01)

(52) **U.S. Cl.** **439/350**

(58) **Field of Classification Search** 439/350,
439/352, 357, 345, 385

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2,143,562 A	1/1939	Kros	439/356
3,215,969 A	11/1965	Verrone	439/118

FOREIGN PATENT DOCUMENTS

CN 1368768 9/2002

(Continued)

OTHER PUBLICATIONS

Notification of First Office Action, issued in corresponding Chinese Application No. 2005110065289.6 on Mar. 3, 2007 (4 pgs).

(Continued)

Primary Examiner — Amy Cohen Johnson

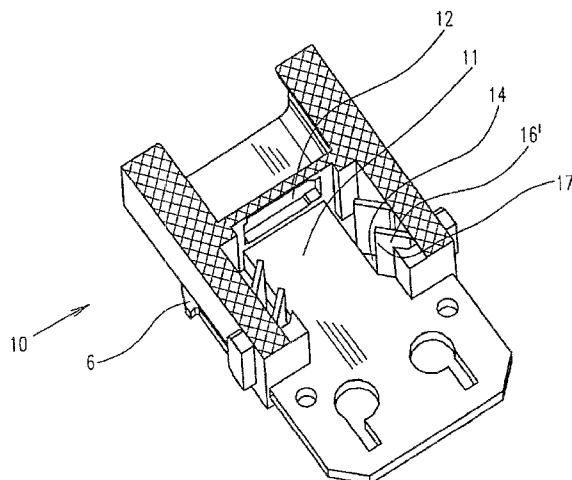
Assistant Examiner — Vladimir Imas

(74) *Attorney, Agent, or Firm* — Hayes Soloway P.C.

(57) **ABSTRACT**

A device for securing a connector in an insulating module housing particularly a USB connector is disclosed. The module housing contains a connection region with at least one location spring arranged therein, wherein the spring end of the location spring is aligned in the connection direction. The spring ends protrude into the connection region so that connectors with non-standardized outside dimensions, inserted between the spring ends are prevented from falling out of the module housing.

18 Claims, 3 Drawing Sheets



U.S. PATENT DOCUMENTS

5,558,534	A *	9/1996	Sarkady et al.	439/352
5,599,207	A *	2/1997	Lai	439/567
5,620,330	A *	4/1997	Pizon	439/350
5,695,355	A *	12/1997	Hasenfratz et al.	439/357
5,746,618	A *	5/1998	Gauker	439/352
5,749,746	A *	5/1998	Tan et al.	439/357
5,803,760	A *	9/1998	Ito et al.	439/310
5,997,333	A *	12/1999	Konda et al.	439/352
6,083,030	A *	7/2000	Wright	439/352
6,102,726	A *	8/2000	Tsuji et al.	439/352
6,123,575	A *	9/2000	Huang et al.	439/489
6,139,350	A *	10/2000	Mathesius	439/357
6,264,504	B1	7/2001	Wu	439/607
6,312,277	B1 *	11/2001	Holub	439/352
6,319,040	B1 *	11/2001	Chang	439/352
6,325,653	B1 *	12/2001	Takahashi	439/260
6,340,310	B2 *	1/2002	Henrici et al.	439/346
6,394,842	B1 *	5/2002	Sakurai et al.	439/607.25
6,413,112	B2 *	7/2002	Semmeling et al.	439/358
6,441,788	B1 *	8/2002	Ishizuka et al.	343/702
6,478,631	B1 *	11/2002	Dutton et al.	439/707
6,491,542	B1 *	12/2002	Zerebilov	439/489
6,497,516	B1 *	12/2002	Toyooka et al.	385/78
6,533,602	B2	3/2003	Nankou	439/352
6,592,391	B1 *	7/2003	Wu	439/352
6,612,860	B2 *	9/2003	Droesbeke	439/357
6,776,658	B2	8/2004	Tang	439/607
7,374,349	B2 *	5/2008	Wang	385/92

8,038,463	B2	10/2011	Ferderer	439/350
2002/0048986	A1 *	4/2002	Lewis et al.	439/345
2002/0151205	A1	10/2002	Huetter et al.	439/352
2003/0049959	A1 *	3/2003	Yamashita	439/352
2003/0049960	A1 *	3/2003	Epe et al.	439/352
2003/0139081	A1 *	7/2003	Hall et al.	439/352
2004/0014350	A1 *	1/2004	McMullen et al.	439/350
2004/0023545	A1 *	2/2004	Wu	439/352
2004/0023546	A1 *	2/2004	Wu	439/352
2004/0029444	A1	2/2004	Tang	439/607

FOREIGN PATENT DOCUMENTS

CN	2582214	10/2003
DE	2534292	7/1975
DE	10104288	1/2001
EP	0420458	9/1990
JP	2002517075	6/2002
WO	WO 99/62145	12/1999

OTHER PUBLICATIONS

Rejection Decision, issued in corresponding Chinese Application No. 200510065289.6 on Jan. 4, 2008 (5 pgs).

Action issued in corresponding Japanese Application No. 2005-136355 on Feb. 1, 2008 (4 pgs).

Action issued in corresponding Canadian Application No. 2,506,922 on Aug. 1, 2007 (3 pgs).

European Examination Report, dated Sep. 16, 2011 (6 pgs).

* cited by examiner

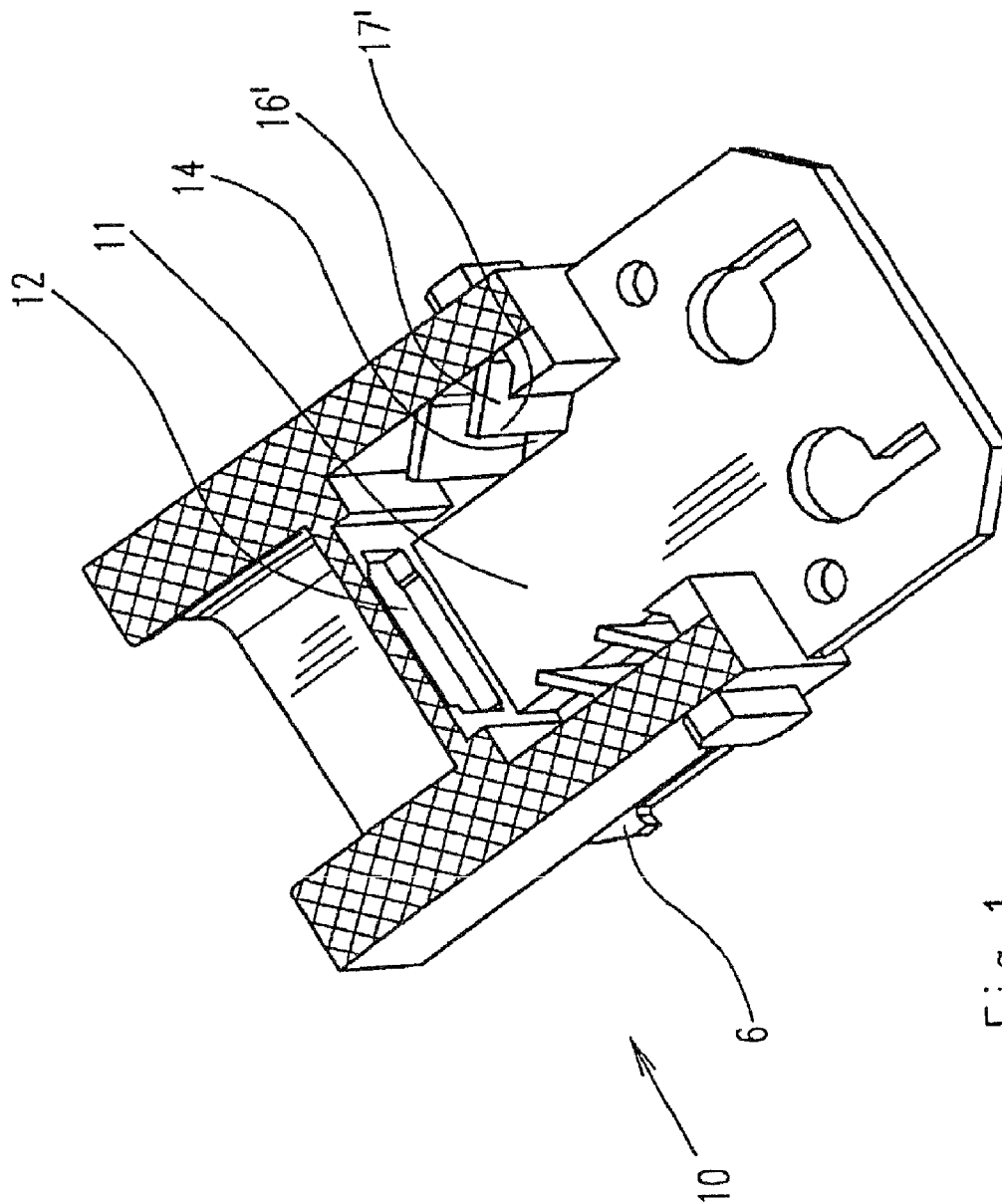


Fig. 1

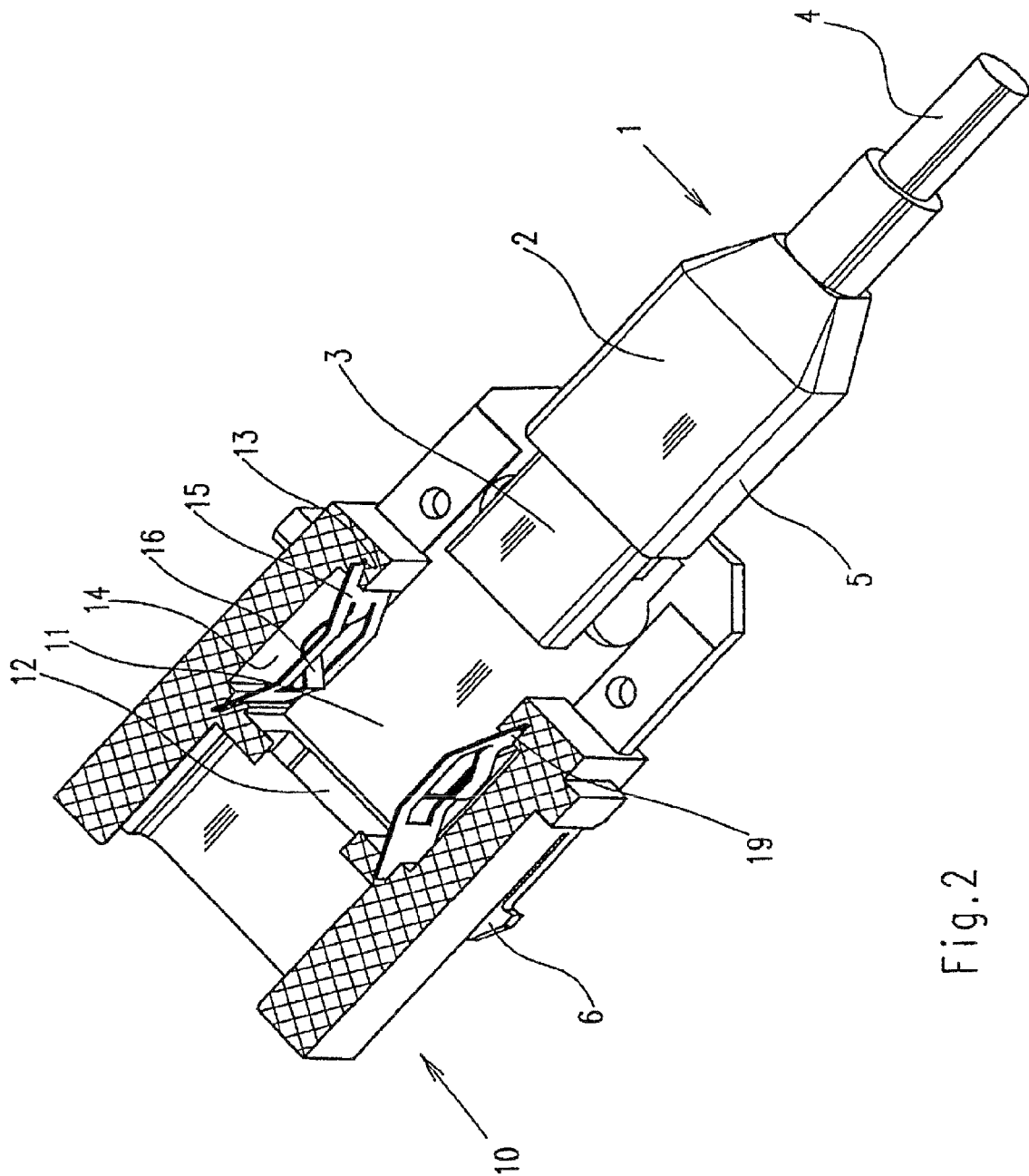


Fig. 2

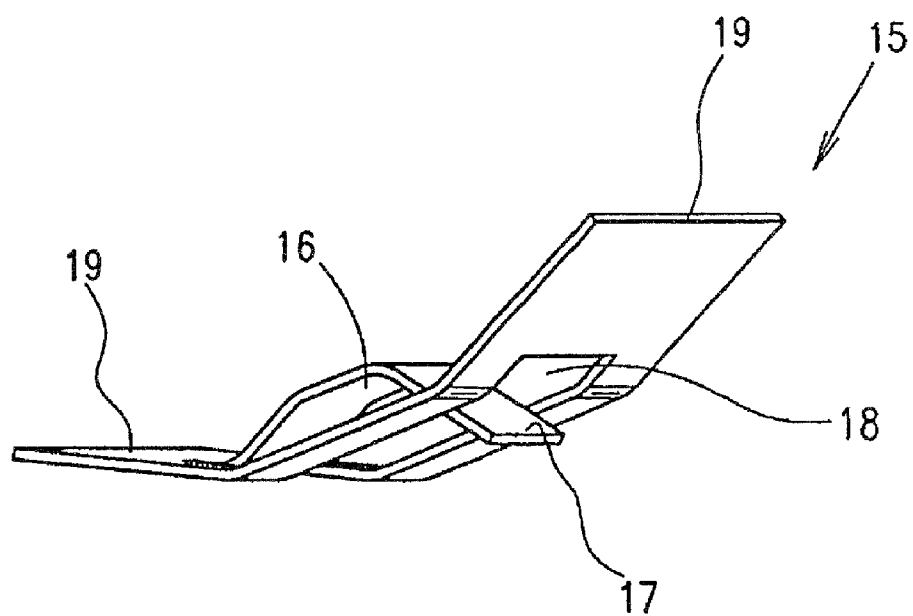
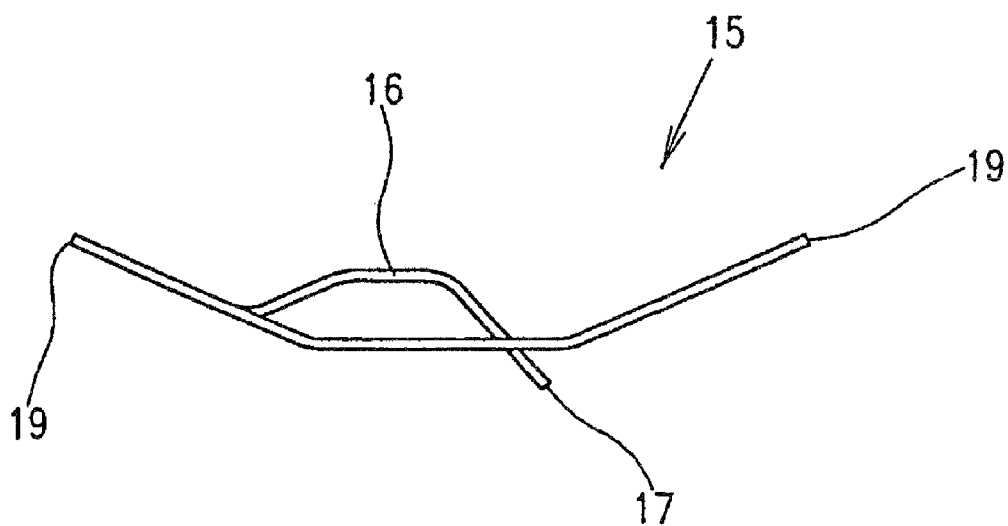


Fig.3



DEVICE FOR SECURING A CONNECTOR

CROSS REFERENCE TO RELATED APPLICATION

This application is a continuation-in-part of U.S. patent application Ser. No. 11/120,020, filed May 2, 2005, now U.S. Pat. No. 8,038,463 the entire disclosures of which is incorporated herein by reference.

TECHNICAL FIELD

The invention pertains to a device for securing a connector in an insulating module housing of a modular connector.

A device according to the invention is required for automatically interlocking a connector with a module housing or a mating connector.

BACKGROUND OF THE INVENTION

Conventional connector locking mechanisms utilize, among other things, screws, hooks, clamping devices or holding clips and always require corresponding manual activities. In the field of office communication interfaces, there is an increasing demand for a simple connecting mechanism that can be operated by any layman.

BRIEF SUMMARY OF THE INVENTION

Consequently, the invention is based on the objective of developing a device of the initially cited type for securing a connector in such a way that the connector and a corresponding module are automatically interlocked when the connection is produced.

This objective is attained in that the module housing contains a connecting region with at least one locating spring arranged therein, wherein the end of said locating spring is aligned in the connecting direction and protrudes into the connecting region.

The advantage attained with the invention can be seen, in particular, in that the connector to be inserted into a module is automatically interlocked therewith when this connection is produced, namely without requiring any additional activities to be performed by the person producing the connection.

There are no exact specifications or requirements with respect to the dimensions of the connectors that are usually delivered in the form of ready-made goods with extrusion-coated cables connected thereto, e.g., analogous to so-called USB connectors.

Symmetrically arranged locating elements are advantageously provided in the module housing for receiving such a connector housing, wherein said locating elements comprise locating springs that are directed into the connecting region of the module housing at a flat angle and secure the connector housing on both sides.

The module housing, in turn, can be engaged with or screwed to the frame of a modular connector that accommodates several modules.

When the connection is produced, the locating spring aligned in the connecting direction initially slides along the narrow sides in the connecting region of the connector housing, but immediately interlocks in the relatively soft housing wall of the connecting region when attempting to pull out the connector.

It is also advantageous that connector housings with largely non-standardized outside dimensions can be secured in the module housing even if they have a certain bandwidth.

BRIEF DESCRIPTION OF THE DRAWINGS

One embodiment of the invention is illustrated in the figures and described in greater detail below. The figures show:

FIG. 1, a perspective representation of a sectioned module housing;

FIG. 2, a connector that is partially inserted into the module housing, and

FIG. 3, an individual spring element.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 shows a perspective representation of a sectioned module housing 10. Locating hooks 6 are integrally formed onto the respective outer edges in order to engage the module housing with the frame of a (not-shown) modular connector that also accommodates other module housings arranged in a row.

The module housing 10 contains a connecting region 11, as well as an opening 12, through which an inserted connector 1 protrudes in order to be contacted with a mating connector.

The connector 1 used is delivered in the form of a ready-made cable connection together with an electric cable 4. The cable connection is formed by the connector 1 consisting of a connector housing 2 with a connecting region 3, as well as a cable 4 connected thereto.

The connecting region 3 is delivered by the various connector manufacturers with a certain bandwidth, but with different dimensions. Consequently, one variably designed interlocking device can be advantageously utilized for securing a connector.

Such an interlocking device is provided in the connecting region 11 of the module housing, wherein at least one locating spring 16—that extends into a depression 14 in the bottom of the module housing—is integrally formed onto the respective narrow sides of the module housing.

In this case, two successively arranged locating springs 16' are integrally formed in a graduated fashion onto both sides of the connecting region, wherein the ends 17' of said locating springs are directed into the connecting region 11 and aligned in the connecting direction at an angle of approximately 45° relative to the wall.

When the connector housing 2 is inserted into the module housing 10, the spring ends 17' initially slide along the narrow housing sides in the connecting region 5, but generate a wedge effect when attempting to pull out the connector.

FIG. 2 shows a perspective representation of a connector 1 that already is partially inserted into a module housing 10 illustrated in the form of a section. A variation of the interlocking device shown in FIG. 1 is provided on this module, wherein two opposing spring elements 15 are arranged in the connecting region 11 such that they respectively point into the connecting region 11 with a locating spring 16 or with their end 17.

The spring elements 15 are secured in slots 13 with their ends 19 and captively inserted into the module housing through an installation opening 14 provided on one side.

When the connector 1 is additionally inserted into the module housing 10 until the connecting region 3 of the connector housing protrudes into the opening 12 in the module housing, the narrow sides of the connector housing slide along the locating springs 16, wherein the connector is prevented from sliding back out due to the alignment of the locating springs in the connecting direction.

FIG. 3 shows a spring element 15 that has a slightly U-shaped curvature, wherein a locating spring 16 that is cut

3

out on three sides protrudes from the center of said spring element. The locating spring is initially bent in accordance with the curvature of the spring element, but protrudes from the opening 18 opposite to the curvature with the spring ends 17.

The curvature is required in order to hold the locating element within the slots 13 in the module 10 with a certain tension.

In order to separate the connector, the locating springs 16 need to be bent back from outside. This is achieved by inserting a flat tool for bending back the locating springs into the bottom opening 14 in the module housing 10.

However, this effort is quite justifiable in light of the fact that these connectors are incorporated into a system interface equipped with several modular connectors and, as a rule, only manipulated when a new system is installed. In other respects, the connectors held in the modular connector are also disengaged when the two halves of the modular connector are separated from one another.

The invention claimed is:

1. A device for securing a first connector in a housing of a second modular connector, wherein the first connector also includes a housing, and the housing of the second connector contains a connecting region with at least one locating spring arranged therein,

wherein the locating spring is integrated into a flat, U-shaped spring element, and the locating spring protrudes from the spring element opposite to the U-shape with its end, and

wherein a spring end of said locating spring is aligned in a connecting direction and protrudes into the connecting region, whereby to generate a wedge effect against walls of an installed connector.

2. The device according to claim 1, wherein the locating spring is integrally formed onto the housing of the second connector within the connecting region.

3. The device according to claim 1, wherein the spring element is inserted into slots in the connecting region of the housing of the second connector.

4. The device according to claim 1, wherein at least one opening is provided in a bottom region of the housing of the second connector.

5. The device according to claim 2, wherein the spring element is inserted into slots in the connecting region of the housing of the second connector.

6. The device according to claim 2, wherein at least one opening is provided in a bottom region of the housing of the second connector.

4

7. The device according to claim 1, wherein the spring element is inserted into slots in the connecting region of the housing of the second connector.

8. The device according to claim 1, wherein at least one opening is provided in a bottom region of the housing of the second connector.

9. The device according to claim 1, wherein the at least one locating spring is electrically isolated within the connection region.

10. A device for securing a first connector in a housing of a second modular connector, wherein the first connector also includes a housing, and the second connector housing includes an insulating module which contains a connecting region with at least one locating spring arranged therein,

wherein the locating spring is integrated into a flat, U-shaped spring element, and the locating spring protrudes from the spring element opposite to the U-shape with its end, and

wherein a spring end of said locating spring is aligned in a connecting direction and protrudes into the connecting region, whereby to generate a wedge effect against insulating walls of an installed connector.

11. The device according to claim 10, wherein the locating spring is integrally formed onto the housing of the second connector within the connecting region.

12. The device according to claim 10, wherein the spring element is inserted into slots in the connecting region of the housing of the second connector.

13. The device according to claim 10, wherein at least one opening is provided in a bottom region of the housing of the second connector.

14. The device according to claim 11, wherein the spring element is inserted into slots in the connecting region of the housing of the second connector.

15. The device according to claim 11, wherein at least one opening is provided in a bottom region of the housing of the second connector.

16. The device according to claim 10, wherein the spring element is inserted into slots in the connecting region of the housing of the second connector.

17. The device according to claim 10, wherein at least one opening is provided in a bottom region of the housing of the second connector.

18. The device according to claim 10, wherein the at least one locating spring is electrically isolated within the connection region of the second connector.

* * * * *